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# Cancer Investigation

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The Official Journal of The Chemotherapy Foundation and The Inter-American Society for Chemotherapy (IASC)

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## Hair Dyes, Cancer, and Epidemiology

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Hair dye use apparently does not increase the risk of developing breast cancer, bladder cancer, or cancer of all sites combined, but could it cause leukemia, lymphoma, or multiple myeloma? Correa and colleagues sift through the epidemiologic data for each disease in a pair of thoughtful and painstaking reviews (1,2). They find the evidence for leukemia and myelodysplastic syndrome weak. This does not look like a promising lead for further research into the etiology of leukemia. The evidence on lymphoma and multiple myeloma is quite conflicting, with no obvious way to reconcile the findings or explain the differences.

The present confusing state of the literature on hair dyes and non-Hodgkin's lymphoma (NHL) in particular raises additional questions. First, why is the literature so mixed, with no obvious methodologic challenges at work? It may not be voluminous, but it is certainly substantial. When as much data had accrued on hair dyes and other cancers, the findings had settled down to a clear pattern. The strongest evidence for increased NHL risk comes from case-control studies, and the strongest evidence against comes from cohort studies. Recall bias in the case-control studies may operate, but the null findings from many case-control studies of other cancers argue against it. Correa et al. suggest that cohort studies may have lacked data on exposure during the critical period. Indeed, hair dye use, often begun in the sixth decade of life, contrasts with smoking, drinking, or eating habits often established in early adulthood. Further, uncertain mechanisms of action for immune disease complicate the assessment of timing; viruses and immunosuppressive medications affect lymphoma risk very quickly, but an effect of hair dyes could be more delayed. For these reasons, Correa et al. recommend detailed analyses of timing.

Even if new investigations of NHL and hair dyes are

large and collect great detail on type and timing of exposure, can we foresee how will these add to the existing data? Ideally, new studies would be mutually consistent and shift the weight of the evidence one way or the other. Conceivably, even with more refined exposure definitions, new case-control and new cohort data could conflict in parallel with the older studies, then resolution would focus on selection bias and recall bias, neither obvious concerns at present.

Finally, these reviews highlight the subtle arithmetic of public health significance and epidemiologic feasibility. Many people have used hair-coloring products, and NHL rates are rising. A link between dyes and NHL could have great public health significance. On the other hand, NHL is a rare disease, and relevant exposure with epidemiologically detectable effects, perhaps regular use of permanent dyes in dark colors, may be rare too. Thus, very large studies may be needed to satisfy the demands of research that was motivated, in part, by a high prevalence of the exposure.

It would be premature to decide whether exposure to hair dyes can alter the risk of lymphoma or multiple myeloma. We can expect that additional investigations will add much information to the literature in the next few years. We can hope that the added data will clarify a temporarily confusing body of epidemiologic research.

### REFERENCES

1. Correa A, Mohan A, Jackson L, et al: Use of hair dyes, hematopoietic neoplasms, and lymphomas: a literature review. I. Leukemias and myelodysplastic syndromes. *Cancer Invest* 366-380, 2000.
2. Correa A, Jackson L, Mohan A, et al: Use of hair dyes, hematopoietic neoplasms, and lymphomas: a literature review. II. Lymphomas and multiple myeloma. *Cancer Invest* 467-479, 2000.